Centre for Quantum Engineering & MQ Photonics Research Centre seminar

When: Thursday 8 April 2021 at 1 PM (Australia Sydney local time) Location: <u>MPR and via Zoom</u>: Join from a PC, Mac, iPad, iPhone or Android device: Please click this URL to start or join: https://macguaria.zoom.ug/i/201401275242pud=M0J5)////rol.llaoDhp021JolJ5phm22

https://macquarie.zoom.us/j/89140137524?pwd=M0JEVVYraUlaeDhpQ3JJcUFnbmp3dz09

Title: "Sub-wavelength quantum imaging for astronomy and LIDAR detection"

Abstract: The resolution limit of standard imaging techniques is expressed by the Rayleigh criterion, which states that two point-like sources are difficult to resolve if their transverse separation is smaller that the Rayleigh length. While the criterion is useful in the case of direct detection imaging, other measurement techniques may not be subject to this limitation. Here we consider the use of imaging to estimate the distance between an arbitrary number of incoherent point sources. In the regime of weak signals, a structured measurement obtained by concatenating a linear interferometer with on-off photodetection is immune to the Rayleigh curse. In this way, we clarify the relationship between imaging and interferometry, and establish the optimality of linear interferometry for an arbitrary number of incoherent sources. We apply these techniques to LIDAR detection as well as exoplanet detection, finding optimal measurements for both these tasks.



Dr Zixin Huang, Macquarie University SQA Fellow



